Claims

1. A rubber composition usable for the manufacture of tires, comprising, as base constituents, a diene elastomer, a white filler as reinforcing filler and a coupling agent (white filler/elastomer) that links the reinforcing filler and the elastomer, the white filler comprising a titanium oxide having the following characteristics:

(a) it comprises by mass more than 0.5% of a metallic element, other than titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

(b) its specific BET surface area is between 20 and 200 m^2/g;

(c) its average particle size (by mass), d_w, is between 20 and 400 nm; and

(d) its disagglomeration rate, α, measured by the ultrasound disagglomeration test, at 100% power of a 600-watt ultrasonic probe, is greater than $2x10^{-2}$ $\mu m^{-1}/s$..

2. The composition according to Claim 1, wherein the total quantity of reinforcing filler is between 20 and 400 phr (parts by weight to one hundred parts of elastomer).

3. The composition according to Claim 1, wherein the BET surface area of the titanium oxide is within a range of 30 to 150 m^2/g.

4. The composition according to Claim 1, wherein the average particle size d_w of the titanium oxide is within a range of 30 to 200 nm.

5. The composition according to Claim 1, wherein the disagglomeration rate α of the titanium oxide is greater than $5x10^{-2}$ $\mu m^{-1}/s$.

6. The composition according to Claim 1, wherein the reinforcing white filler comprises more than 50% by weight titanium oxide.

7. The composition according to Claim 1, wherein the total reinforcing white filler is titanium oxide.

8. The composition according to Claim 1, wherein the reinforcing white filler further comprises silica and/or alumina.

9. The composition according to Claim 1, further comprising one or more carbon blacks as a reinforcing filler.

10. The composition according to any of Claims 1 and 9, wherein the quantity total of reinforcing filler is between 30 and 200 phr.

11. The composition according to Claim 1, wherein the quantity of coupling agent is between 10^{-7} and 10^{-5} mole per square meter of reinforcing white filler.

12. The composition according to Claim 11, wherein the quantity of coupling agent is between $5x10^{-7}$ and $5x10^{-6}$ moles per square meter of reinforcing white filler.

13. The composition according to Claim 1, wherein the titanium oxide satisfies one or both of the following characteristics:

- its BET surface area is within the range of 70 to 140 m^2/g;
- its particle size d_w is within the range of 50 to 100 nm.

14. The composition according to Claim 1, wherein the titanium oxide satisfies all the following characteristics:

- it comprises by mass more than 1% of a metallic element other than titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

- its BET surface area is within the range of 70 to 140 m^2/g;

- its particle size d_w is within the range of 50 to 100 nm; and

- its disagglomeration rate α is greater than 5×10^{-2} $\mu m^{-1}/s$.

15. The composition according to Claim 1, wherein the coupling agent is a polysulphurized alkoxysilane.

16. The composition according to Claim 1, wherein the diene elastomer is selected from the group consisting of polybutadienes, polyisoprenes, natural rubber, butadiene-styrene copolymers, butadiene-isoprene copolymers, butadiene-acrylonitrile copolymers, isoprene-styrene copolymers, butadiene-styrene-isoprene copolymers, and mixtures thereof.

17. The composition according to Claim 16, wherein the diene elastomer is a butadiene-styrene copolymer prepared in solution having a styrene content of between 20% and 30% by weight, a content of vinyl bonds of the butadiene part of between 15% and 65%, a content of trans-1,4 bonds of between 20% and 75% and a glass transition temperature of between -20°C and -55°C.

18. The composition according to Claim 17, further comprising a polybutadiene having more than 90% cis-1,4 bonds.

19. The composition according to Claim 1, wherein the diene elastomer is an EPDM copolymer.

20. A reinforcing filler comprising a titanium oxide having the following characteristics:

(a) it comprises more than 0.5% by mass of a metallic element other than titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

(b) its specific BET surface area is between 20 and 200 m^2/g;

(c) its average particle size (by mass), d_w, is between 20 and 400 nm; and

(d) its disagglomeration rate, α, measured by the ultrasound disagglomeration test, at 100% power of a 600-watt ultrasonic probe, is greater than $2x10^{-2}$ $\mu m^{-1}/s$, wherein the filler reinforces a diene rubber composition usable for manufacturing tires.

21. A process for reinforcing a diene rubber composition usable for the manufacture of tires, comprising incorporating by mechanical kneading into the diene rubber composition in an uncured state a titanium oxide having the following characteristics:

(a) it comprises more than 0.5% by mass of a metallic element, other than titanium, selected from the group consisting of Al, Fe, Si, Zr and mixtures thereof;

(b) its specific BET surface area is between 20 and 200 m^2/g;

(c) its average particle size (by mass), d_w, is between 20 and 400 nm; and

(d) its disagglomeration rate, α, measured by the ultrasound disagglomeration test, at 100% power of a 600-watt ultrasonic probe, is greater than $2x10^{-2}$ $\mu m^{-1}/s$.

22. A rubber article comprising a composition according to Claim 1.

23. A tire comprising a rubber composition according to Claim 1.

24. A colored tire comprising a rubber composition according to Claim 1.

25. A tread for a tire comprising a rubber composition according to Claim 1.

26. A colored tread for a tire comprising a rubber composition according to Claim 1.